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ABSTRACT

Test results (1968-1977) on the English and mathematics achievement subtests of the Washington Precollege Test (WPC), administered annually to the vast majority of college bound students in the state of Washington, were examined for evidence of test score decline. The following information from 300,000 students was analyzed by both sex and total group for each year of the ten-year period: the nine WPC English and mathematics subtests; high school grades, and high school credits earned. Early trends (1968-1972) paralleled national declines, since scores decreased on all but two of the mathematics subtests. Between 1973 and 1977, only the vocabulary and English usage subtests continued to decline, at an annual rate of two to three percent of a standard deviation. The applied mathematics subtest showed an increase, while the other English and mathematics subtests remained constant. Females scored higher than males on the English subtests, while males scored higher than females on the mathematics, spatial ability, and mechanical reasoning areas. Grades continually increased over the ten year period, as did the amount of credits taken. Largest increases were in the elective and miscellaneous courses; traditional academic areas showed slight increases. Overall grade point average was between a C plus and B in 1968, and over a B in 1977. (CP)

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**A Ten-Year Study of Test Scores
for College-Bound Students in
the State of Washington**

TM009 435

A 10-Year Study of Test Scores for
College-Bound Students in the State of Washington

The Washington Pre-College (WPC) Test is taken annually by the vast majority (almost 30,000) of college-bound students in the state. The purpose of this report is to examine the recent 10-year period of WPC Test scores (1968-1977) to determine whether Washington college-bound students have experienced the type of test score declines that have been evidenced nationally.

The WPC Test exists primarily as an assessment tool to assist college-bound students in making better-informed career plans and decisions. It contains nine cognitive ability and achievement subtests, a vocational interest inventory, and predictions of student performance for many different college course areas based on students' test scores and high school grades.

During the early part of the study (1968-1972), students decreased on all four WPC English subtests (vocabulary, English usage, spelling, and reading comprehension). They also decreased on two of the three math areas (applied math and math achievement) and in the spatial ability area. These trends parallel national test score declines for college-bound students.

Results from the second half of the study (1973-1977), however, do not resemble national trends. Only the vocabulary and English usage subtests continued to decline. The remaining English subtests, spelling and reading comprehension, remained constant. Also students remained constant on the quantitative skills and math achievement subtests and increased on the applied math subtest. They also remained constant on the spatial ability and mechanical reasoning areas of the WPC Test.

The time period of this study plus the rise in academic credits taken by Washington students coupled with the fact that some of the WPC subtests are more achievement than aptitude in nature may account for the differences in score decline observed when compared to national test data.

This report was written by Richard J. Noeth, Executive Director, The Washington Pre-College Testing Program, Seattle, Washington, March, 1979.

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A 10-Year Study of Test Scores for College-Bound Students in the State of Washington

Over the past several decades, psychological testing has experienced periods of both keen interest and general apathy. In the late 1950's and early 1960's, after Sputnik was launched, psychological tests were to help us identify students with math and science skills who would regenerate American education and hopefully get us to the moon first (perhaps it worked!). During the hippie movement, flower power, and the anti-war sentiments of the late 1960's and early 1970's, tests and their uses were either decried with other establishment values or ignored completely. Lately, however, psychological testing has come squarely front and center in the attention paid to it by a concerned society.

Purpose of this Report

The State of Washington is in a unique position to examine test score trends for college-bound students within its boundaries. The Washington Pre-College (WPC) Test is taken annually by the vast majority of college-bound students in the state. In addition, high school grades and amounts of high school credit are gathered directly from the high schools on test-takers through the Washington Pre-College Testing Program (WPCTP).

The purpose of this report is to examine the recent 10-year period of WPC Test scores (i.e., 1968 through 1977) to ascertain whether Washington college-bound students have experienced the type of score declines that have been evidenced nationally. In addition, trends in high school grades and credits will be presented to provide additional insight on the academic experiences of these students.

How Extensive is the Test Score Decline Nationally?

Clearly, the test score decline has captured the ongoing interest of educators, media people, parents, and society in general. Reports are constantly being published discussing the decline and the many potential reasons that may account for it.

Two primary sources which evidence the scope of the test score decline are from The American College Testing Program (ACT) (Munday, 1976) and the College Entrance Examination Board (CEEB) (1977). Both reports provide a substantial review of the research and present trend data on their respective college entrance examinations (the ACT Assessment and the Scholastic Aptitude Test) as well as on some other assessment programs.

The ACT study reports that for the period from 1964-65 through 1974-75, the ACT composite average scores declined 1.2 standard scores (range = 1-36) or about 2% of a standard deviation per year. The ACT tests cover skills in four academic areas. Munday's study found no decline in natural sciences, some decline in English and mathematics, and a substantial decline in social studies. His report also indicated that the decline in test scores has been more marked for women than for men. In every area except mathematics, scores for women have declined more than scores for men, with the greatest difference being in the social studies area. This has been paralleled by an almost steady increase in the percentage of women among ACT-tested students over the last 10 years. Other findings include the fact that the standard deviation for the ACT composite has increased over the 10 year span which indicated that the variability of overall student achievement has increased. Declining ACT test scores were found to be a national phenomenon, occurring in all regions and almost all states.

The College Board study indicated similar trends to the ACT test on both the verbal and mathematics portions of the Scholastic Aptitude Test (SAT).

From 1963 to 1977 a 49 point standard score drop (range = 200-800) was reported on the SAT verbal component and a 32 point drop in the mathematical part. Cleary and McCandless (1977) cite this as about 3% of a standard deviation per year. The CEEB report segregates the SAT score decline into two periods, pre- and post-1970. During the earlier period there were significant proportionate increases in the test-taking population of three groups that have always registered substantially lower-than-average scores on the SAT: students from lower-socioeconomic-status families, members of minority ethnic groups, and (on the mathematical but not the verbal portion) women. For example, women represented nearly 43% of the SAT-taking group in 1960, almost 48% in 1970, and 51% in 1977. The CEEB report indicates that these factors may have accounted for two-thirds to three-fourths of the decline during the pre-1970 period. The SAT standard deviations, according to Cleary and McCandless (1977), however, have remained constant over the entire decline period, reflecting consistent variability in student ability levels.

The data substantiating the decline on the two college admissions tests cited above were obtained from a particular sub-population of students (i.e., those who are college bound). However, evidence suggests the decline applies to all high school students in the country. Project TALENT, a study that has examined the development of American adolescents, showed that performance on language and mathematics declined from 1960 to 1975 (Flanagan, 1976). The Minnesota Scholastic Aptitude Test, taken by almost all high school juniors in that state, showed a decline from 1965-66 through 1972-73 that averaged about 4% of a standard deviation per year (Perry and Swanson, 1974). The Iowa Tests of Educational Development (ITED), taken by most of that state's high school juniors, also began to show a decline after 1965. According to Munday (1976), from 1965-1974 the decline on the ITED composite has averaged about 2% of a standard deviation per year.

Similar directional changes, though of less magnitude, appear to be taking place at the elementary school level as well. Hoover (1974) reports that for the Iowa Tests of Basic Skills (ITBS), administered to almost all Iowa students from grades three through eight, a substantial decrease was evidenced for both mathematics problem-solving and reading comprehension in all but the lower grades from 1965 to 1972. In discussing the ITBS national norms of 1955, 1963, and 1970, Hieronymous and Lindquist (1974) reported positive changes in the lower grades but consistent losses in both language and mathematics skills for the upper grades.

Conducting the Study

The Washington Pre-College Test

The Washington Pre-College Test is a high school career guidance and college admissions, placement, and advising assessment program completed annually by almost 30,000 Washington state college-bound students. The Washington Pre-College Testing Program, which publishes the Test, is a cooperative agency of high schools and postsecondary institutions in the state of Washington. The Program had its beginning at the University of Washington in the 1940's. Since then, the Program has become a statewide agency, the prototype having been described by Horst (1963), and is jointly governed by two groups representative of secondary and postsecondary institutions statewide: The Washington Council on High School-College Relations and the Washington Pre-College Testing Committee.

The WPC Test exists primarily as an assessment tool to assist college-bound students in making better-informed career plans and decisions. It contains nine cognitive ability and achievement subtests, a vocational interest inventory (Lunneborg, 1977), and predictions of student performance for many different college course areas based on students' test scores and high school grades. It is this last area, the differential prediction of college-level performance,

that contributes much to the uniqueness of the WPC Test. The statistical method of differential prediction was formulated by Horst (1954) early in the Program's history.

This report will focus on the cognitive subtests that constitute the WPC Test. These are the reading comprehension, English usage, spelling, and vocabulary subtests that make up the English portion of the Test, the applied math, quantitative skills, and mathematics achievement units that form the math section, and the spatial ability and mechanical reasoning subtests that complete the WPC battery. The subtests are described in Table 1. Three composite scores (English, verbal, and quantitative) are derived from the subtests. These are formed by applying factor weights, or in the case of the English composite, differential weights, to various combinations of subtests. The verbal composite includes the reading comprehension, English usage, spelling, and vocabulary subtests, the English composite contains all of the preceding except reading comprehension, and the quantitative composite is comprised of all three math subtests.

The nine separately-timed subtests have been standardized on Washington college-bound students since the late 1950's (WPCTP, 1977). These power tests are unspeeeded and 90% of the test-takers usually complete all items on each subtest (WPCTP, 1977). During the time of this study (i.e., 1968-1977) two distinct WPC Test forms were used. The first covered the initial five years of this study (i.e., 1968-1972) and the second the last five years (i.e., 1973-1977). The first was developed under contract with the Educational Testing Service and the second by CTB (California Test Bureau) /McGraw-Hill.

While the items and tests were developed and scaled in an identical fashion by these agencies, they were never statistically equated. However, given the identical test development specifications and strong psychometric properties of both forms, the degree of equivalence between the two forms

Table 1
Subtests of the WPC Test Battery

Subtests	Description
Vocabulary	A 12 minute, 45 item unit which tests students' knowledge of the meaning of words. Students select the correct synonym from five choices to a given word.
English usage	A 20 minute, 45 item test which measures students' knowledge of grammar, correct word usage, capitalization, and punctuation.
Spelling	A 10 minute, 35 item unit which tests students' ability to identify a misspelled word from a choice of five words.
Reading comprehension	A 22 minute unit containing 25 items about several paragraphs. This test measures students' ability to derive stated or implied meanings from the paragraphs.
Quantitative skills	A 27 minute, 45 item test which measures students' ability to decide whether enough information is given to solve a problem and to determine the relative size of two given quantities.
Applied mathematics	A 22 minute, 20 item unit which tests students' ability to solve applied arithmetic and elementary algebra problems.
Mathematics achievement	A 45 minute, 45 item test which measures students' knowledge of algebra and geometry.
Spatial ability	A 10 minute, 20 item unit which tests students' ability to visualize how two dimensional figures would look in three dimensions if folded along certain lines.
Mechanical reasoning	A 15 minute, 20 item test which measures students' knowledge in understanding physical principles as applied to mechanical devices.

should be considerable. The different WPC Test raw scores for each of the tests are equated by using a common scale (standard score units) which ranges from 20.0 to 80.0. The median reliability of the two forms is .92. Complete WPC Test reliability data are reported elsewhere (WPCTP, 1977).

Sample

The sample for this study was all high school students who completed the WPC Test during the spring of their junior year or the autumn of their senior year. Some students complete the WPC Test in the spring of their senior year and others when they enter college (for placement and advising purposes). However, these groups were not included in order to maintain sample homogeneity in terms of age and time of testing. Table 2 presents the study sample according to year and sex.

Data and Analyses

The following student information was analyzed both by sex and total group for each year of the ten year period, 1968-1977: WPC subtests and composites, high school grades, and high school credits earned. Because of the very large sample sizes each year, only very small differences in mean scores are necessary to reach statistical significance. Thus, significance testing was not conducted for this study.

WPC Test Score Trends in Washington

Has there been a score decline in the WPC Test for college-bound students in Washington? Because of the equating problem with two forms of the WPC Test, the second form was subsequently renormed in 1973. This renorming accounted for the apparent increase in scores from 1972 to 1973. Thus, two trends appear, one from 1968 to 1972 and the other from 1973 to 1977 with a discontinuity between 1972 and 1973. This study will examine scores both within and between these time periods.

Table 2

WPC Spring Juniors and Autumn Senior Test-Takers by Sex and Year

Year	Male		Female		Total
	N	%	N	%	
1968	14,892	50.8	14,442	49.2	29,334
1969	15,130	49.8	15,249	50.2	30,379
1970	15,033	49.7	15,216	50.3	30,249
1971	14,205	48.4	15,168	51.6	29,373
1972	13,437	48.2	14,426	51.8	27,863
1973	13,209	47.3	14,729	52.7	27,938
1974	12,864	46.9	14,553	53.1	27,417
1975	12,765	46.9	14,428	53.1	27,193
1976	11,919	45.7	14,140	54.3	26,059
1977	12,248	46.1	14,347	53.9	26,595

Table 3

Trends in the Four WPC English Subtest Means

Year	Vocabulary			English usage			Spelling			Reading comprehension		
	M	F	T	M	F	T	M	F	T	M	F	T
1968	48.5	50.2	49.3	47.0	51.0	48.9	47.3	51.5	49.3	48.9	49.7	49.3
1969	48.1	49.2	48.7	46.3	49.3	47.8	46.7	50.0	48.4	48.3	48.4	48.3
1970	48.1	49.0	48.6	46.2	48.8	47.5	46.5	49.8	48.1	50.1	49.4	49.7
1971	47.9	48.6	48.2	45.6	48.1	46.9	46.2	49.5	47.9	47.1	46.4	46.8
1972	48.7	49.0	48.8	44.6	46.8	45.7	46.9	49.9	48.5	47.3	46.2	46.8

Renorming and changeover in WPC Test forms

1973	49.7	49.0	49.3	47.3	50.4	48.9	46.9	51.3	49.2	48.5	49.4	49.0
1974	49.3	48.3	48.7	46.4	48.9	47.7	46.6	51.0	48.9	49.2	49.6	49.4
1975	48.7	47.7	48.2	45.8	48.2	47.1	46.3	50.5	48.6	49.0	49.5	49.3
1976	48.6	47.7	48.1	46.1	48.4	47.3	46.8	50.9	49.0	49.2	49.4	49.3
1977	48.0	47.5	47.7	45.6	48.3	47.0	47.0	51.2	49.2	48.8	49.4	49.1

Table 3 and Figure 1 present the trends for the four English subtests for males, females, and the total group for the 10 years of the study. For the first five years of the study, the WPC English usage, spelling, and reading comprehension subtests showed a mean decrease for males while the vocabulary subtest scores remained fairly constant. For females, vocabulary, English usage, spelling, and reading comprehension scores all decreased. Total group scores reflect the five-year decrease in all four English subtests. Trends from 1973 to 1977, using the second form of the test were only partially similar to earlier trends. For males and females, as well as the total group, both the WPC vocabulary and English usage subtest scores showed a continual decline. Total group declines paralleled these trends. However, the WPC spelling and reading comprehension subtests over this period indicated no decline and showed fairly consistent patterns for both males and females.

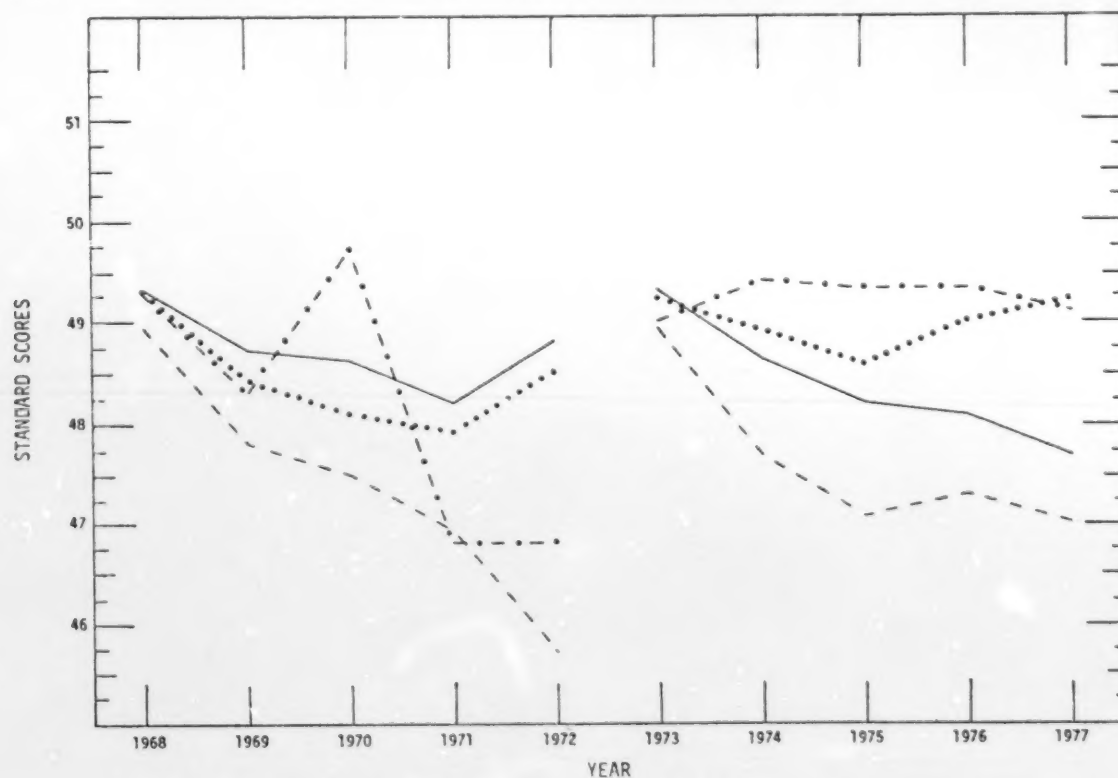


Figure 1. Washington Pre-College Test English scores, all students 1968-1977. (Renorming and a changeover in WPC test forms occurred between 1972 and 1973. Vocabulary = — , English usage = ---, spelling = ..., reading comprehension = -.-.)

Sex differences on the four WPC English subtests tended to favor the females over the 10 year period; that is, females generally scored higher than males on these measures. The only exception during the first part of the study was in reading comprehension where females were higher at the beginning of this period but lower at the end. From 1973 to 1977 males were higher than females on only the vocabulary subtest. In terms of the magnitude of the differences, for the first five years males narrowed the gap on each of the four English subtests and in reading, as mentioned above, began to exceed female scores. The second five years did not show this trend.

Math Subtests

The trends for the three WPC math subtests are shown in Table 4 and Figure 2. During the 1968 to 1972 period, Washington college-bound males showed an increase in the WPC quantitative skills subtest but decreases on both the applied math and math achievement subtests. Females remained fairly constant on quantitative skills

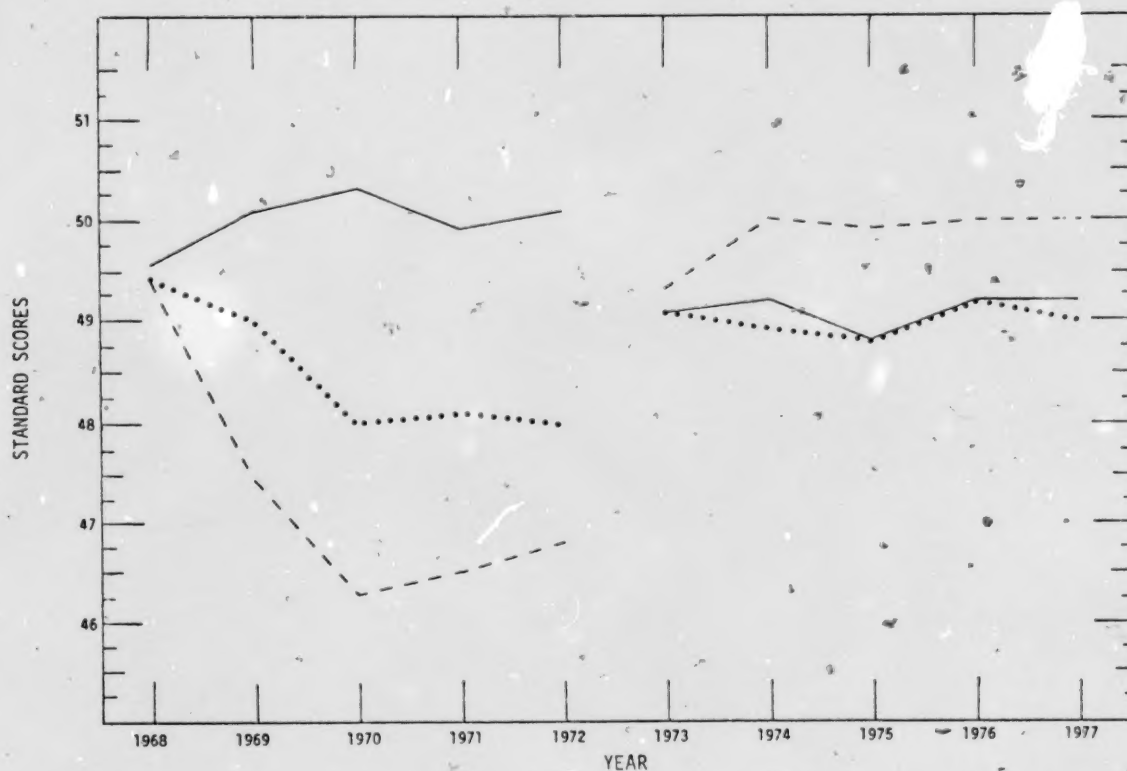


Figure 2. Washington Pre-College math scores, all students 1968-1977. (Renorming and a changeover in WPC test forms occurred between 1972 and 1973. Quantitative skills = — , applied math = --- , math achievement = ...)

but showed decreases on applied math and math achievement. The total group, then, increased slightly on quantitative skills but dropped in applied math and math achievement.

For the second half of the study period (i.e., 1973-1977), males remained fairly constant on both the quantitative skills and math achievement subtests and increased on the applied math subtest. Females also remained fairly constant on both the quantitative skills and math achievement subtests and increased on the applied math subtest. Similar trends were shown by the total group.

The sexes showed different trends on the WPC math subtests than on the English subtests. For both periods of the study on all three subtests, males scored higher than females. The size of the difference, around four standard score units throughout, remained constant over all 10 years of the study.

Other Subtests

For the first five years of the study males decreased on the spatial ability subtest and increased in mechanical reasoning. Females also showed similar patterns on these subtests, a large decrease in spatial ability and a slight increase in mechanical reasoning. The total group had parallel trends. From 1973 to 1977, males increased on spatial ability but remained fairly constant in mechanical reasoning. Females increased slightly in these two areas. The total group showed a slight increase on the spatial ability subtest and remained fairly constant on mechanical reasoning.

Sex differences on these WPC subtests, like the math, were in favor of the males throughout the duration of the study. No trends in decreasing or increasing magnitude of the difference were apparent.

Composite Scores

The trends for the three WPC composite scores are shown in Table 5. From 1968 through 1972, male students showed slight decreases on the English and verbal composites and a slight increase on the quantitative composite score. Females had a slight decrease on the quantitative composite and larger decreases

Table 4
Trends in the Three WPC Mathematics Subtest Means

Year	Quantitative skills			Applied mathematics			Math achievement		
	M	F	T	M	F	T	M	F	T
1968	51.4	47.6	49.6	51.2	47.4	49.4	51.2	47.4	49.4
1969	52.2	48.0	50.1	49.3	45.5	47.4	50.7	47.4	49.0
1970	52.7	48.1	50.3	48.2	44.5	46.3	49.5	46.6	48.0
1971	52.3	47.6	49.9	48.5	44.6	46.5	49.8	46.6	48.1
1972	52.5	47.8	50.1	48.8	45.0	46.8	49.6	46.4	48.0
Renorming and changeover in WPC Test forms									
1973	51.0	47.4	49.1	51.8	47.0	49.3	51.1	47.3	49.1
1974	51.3	47.3	49.2	52.7	47.7	50.0	51.0	47.0	48.9
1975	50.9	47.0	48.8	52.5	47.5	49.9	51.0	46.8	48.8
1976	51.3	47.4	49.2	52.8	47.7	50.0	51.4	47.3	49.2
1977	51.0	47.6	49.2	52.5	47.8	50.0	51.0	47.4	49.0

Table 5
Trends in the WPC English, Verbal, and Quantitative Composite Means

Year	English composite			Verbal composite			Quantitative composite		
	M	F	T	M	F	T	M	F	T
1968	47.3	50.9	49.1	47.3	51.1	49.1	51.3	47.8	49.6
1969	47.0	49.6	48.3	46.3	49.2	47.7	51.7	48.0	49.8
1970	47.2	49.5	48.3	47.1	49.7	48.4	51.6	47.7	49.6
1971	46.7	49.0	47.9	47.0	49.5	48.3	51.4	47.4	49.3
1972	46.8	48.6	47.7	47.1	49.2	48.2	51.5	47.6	49.5
Renorming and changeover in WPC Test forms									
1973	47.9	49.9	49.0	47.4	49.6	48.5	51.3	46.8	48.9
1974	47.2	48.9	48.1	47.2	49.0	48.1	51.8	47.0	49.2
1975	46.6	48.2	47.5	46.7	48.4	47.6	51.6	46.8	49.0
1976	46.8	48.4	47.6	46.9	48.6	47.8	51.9	47.1	49.3
1977	46.3	48.3	47.4	46.6	48.5	47.6	51.6	47.2	49.2

on the English and verbal composites. The total group trends paralleled the sex trends with a fairly constant quantitative composite and decreases on the English and verbal composite.

From 1973 to 1977 some of these trends showed reversals. Males, for example, dropped on the English and verbal composite scores and increased slightly on the quantitative composite. Females also showed declines on the English and verbal composites and a slight gain on the quantitative composite. The combined group showed similar trends in that all college-bound students showed a decrease in the English and verbal composite and a slight increase in the quantitative composite score.

Grade and Credit Trends for Washington College-Bound Students

As part of its assessment service to students and institutions, the Washington Pre-College Testing Program gathers students' high school grades and amounts of credits earned (from ninth through eleventh grade). This information is reported on the WPC Guidance Report along with WPC Test scores to give a complete summary of academic performance and background. These GPAs and credit data are presented below to provide further insight into the academic trends of Washington's college-bound students.

High School Grades

Six areas of high school grades are collected and reported for students completing the WPC Test. College-bound students' GPAs from 1968 through 1977 are available separately for all English, math, natural science, social science, and foreign language courses as well as for overall coursework. Table 6 and Figure 3 present the overall, English, and math GPAs. Table 7 contains GPA data in the natural science, social science, and foreign language areas over the 10 year period.

For all six of the GPA areas one major trend exists - continual increases for all students throughout the period of the study. The overall GPA for all WPC

Table 6

Overall, English, and Math GPA's for WPC-Tested Students from 1968 to 1977

Year	Overall GPA			English GPA			Math GPA		
	M	F	T	M	F	T	M	F	T
1968	2.57	2.85	2.71	2.43	2.89	2.66	2.30	2.44	2.37
1969	2.64	2.88	2.76	2.51	2.93	2.72	2.35	2.46	2.41
1970	2.70	2.92	2.81	2.58	2.98	2.78	2.39	2.49	2.44
1971	2.73	2.97	2.86	2.65	3.04	2.85	2.41	2.54	2.48
1972	2.84	3.04	2.95	2.74	3.10	2.92	2.48	2.57	2.53
1973	2.91	3.11	3.01	2.81	3.17	3.00	2.55	2.63	2.59
1974	2.94	3.12	3.04	2.83	3.17	3.01	2.57	2.67	2.62
1975	2.97	3.14	3.06	2.85	3.18	3.02	2.61	2.68	2.65
1976	2.99	3.16	3.08	2.88	3.19	3.05	2.64	2.70	2.67
1977	2.98	3.15	3.07	2.85	3.17	3.02	2.63	2.70	2.66

Table 7

Natural Science, Social Science, and Foreign Language GPA's for WPC-Tested Students from 1968 to 1977

Year	Natural science GPA			Social science GPA			Foreign language GPA		
	M	F	T	M	F	T	M	F	T
1968	2.42	2.61	2.51	2.56	2.80	2.68	2.37	2.84	2.61
1969	2.47	2.62	2.54	2.61	2.81	2.71	2.42	2.88	2.66
1970	2.52	2.66	2.59	2.67	2.86	2.76	2.49	2.90	2.70
1971	2.58	2.73	2.66	2.73	2.93	2.83	2.56	2.99	2.79
1972	2.67	2.78	2.73	2.80	2.99	2.90	2.66	3.04	2.87
1973	2.74	2.86	2.81	2.86	3.06	2.96	2.73	3.09	2.93
1974	2.77	2.86	2.82	2.87	3.05	2.97	2.77	3.12	2.96
1975	2.79	2.87	2.83	2.91	3.07	2.99	2.80	3.12	2.98
1976	2.81	2.89	2.86	2.94	3.09	3.02	2.83	3.14	3.00
1977	2.79	2.87	2.83	2.91	3.07	3.00	2.81	3.14	3.00

Test-takers in 1968 was 2.71 (based on a 4.00 scale). In 1977, the overall GPA for all WPC Test-takers was 3.07.

Besides the fairly distinct increases from 1968 through 1977, there appear to be other interesting aspects to the grade data. Females had higher GPAs in all six areas over the entire 10 year period. In some cases the differences in 1968 were considerable. For example, in English and foreign language courses female-male GPAs were 2.89-2.43 and 2.84-2.37, respectively.

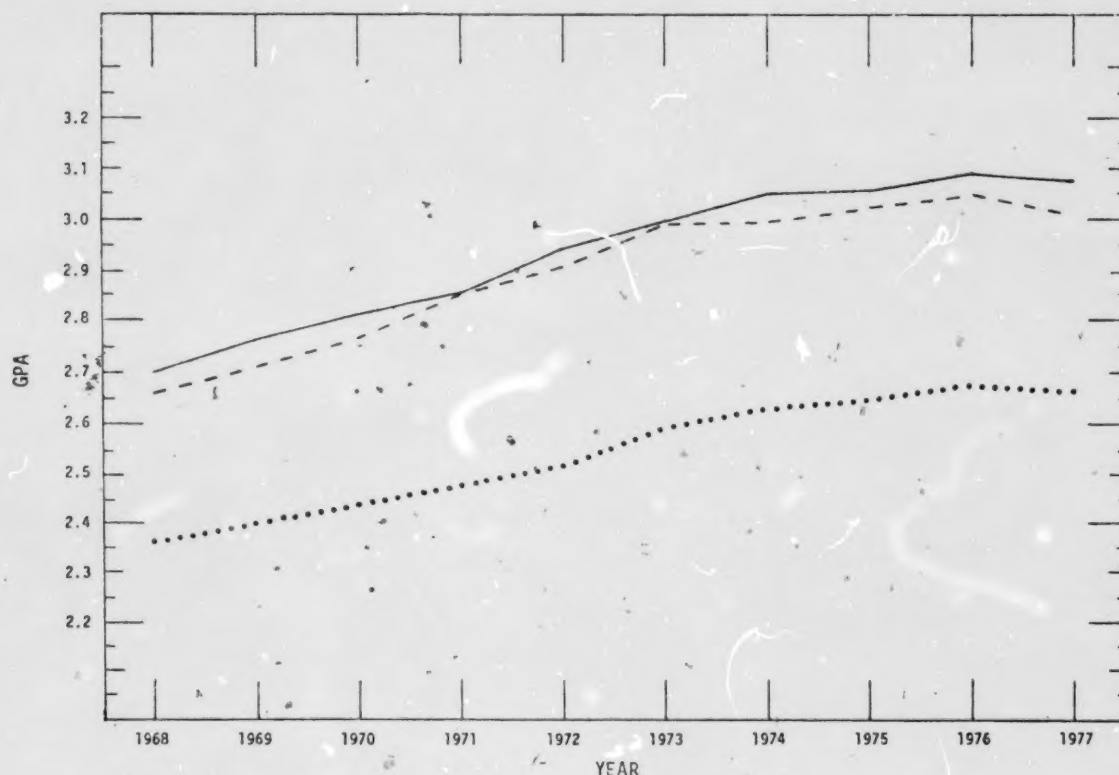


Figure 3. High school grade point average, all students 1968-1977.
(Overall = —, English = --, math = ...)

The gap between male and female high school grades has been narrowing, however. In 1977, the male-female difference in overall GPA was .17 compared to .28 in 1968. Also, the English, foreign language, math, and natural science GPA sex differences have all shrunk over the 10 year period.

Credits Taken

This section presents information on credits earned by Washington college-bound students from 1968 to 1977. Table 8 contains the overall, English, and math credits and Table 9 includes natural science, foreign language, and elective course credits. Figure 4 shows trends for English, math, and elective credits. While the Program also collects and records each specific type of math, natural science, and foreign language credit, these will not be listed here due to the detailed nature of the data. The total math, natural science, and foreign language credits provide a sufficiently accurate picture of statewide trends. The data reported are semester credits. All types of time-credit units (e.g., trimesters, quarters, etc.) are converted to semesters when transcripts are received.

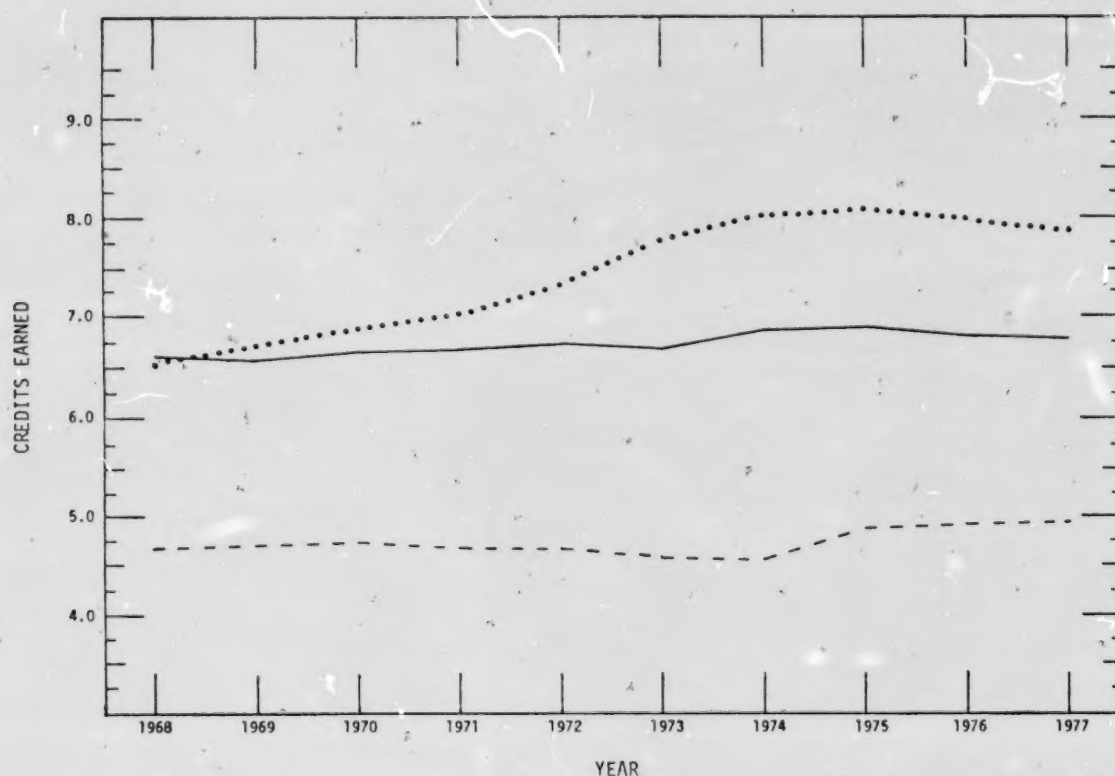


Figure 4. High school credits earned, all students 1968-1977.
(English = —, math = - -, electives = ••••)

Table 8

Overall, English, and Combined Math Credits Earned from Grades 9 through 11 by WPC-Tested Students from 1968 through 1977

Year	Overall			English			Combined math		
	M	F	T	M	F	T	M	F	T
1968	33.69	34.34	34.01	6.51	6.71	6.61	5.08	4.33	4.71
1969 ^a									
1970	34.81	35.49	35.15	6.57	6.75	6.66	5.11	4.36	4.73
1971	35.18	35.75	35.48	6.59	6.74	6.67	5.11	4.33	4.71
1972	35.89	36.44	36.18	6.66	6.79	6.73	5.11	4.31	4.70
1973	36.25	36.78	36.53	6.67	6.76	6.72	5.06	4.34	4.68
1974	36.74	37.14	36.95	6.75	6.84	6.80	5.07	4.32	4.67
1975	37.49	37.89	37.71	6.78	6.88	6.83	5.22	4.50	4.84
1976	37.28	37.61	37.46	6.72	6.82	6.77	5.33	4.59	4.93
1977	37.12	37.39	37.26	6.71	6.81	6.76	5.31	4.62	4.94

^a1969 data were unable to be retrieved.

Table 9

Total Natural Science, Foreign Language, and Elective Credits Earned for Grades 9 through 11 by WPC-Tested Students from 1968 through 1977

Year	Natural science			Foreign language			Electives		
	M	F	T	M	F	T	M	F	T
1968	3.82	3.17	3.50	2.95	3.44	3.19	5.85	7.20	6.52
1969 ^a									
1970	3.84	3.14	3.49	2.95	3.45	3.20	6.19	7.53	6.86
1971	3.90	3.16	3.52	2.85	3.32	3.09	6.37	7.73	7.07
1972	3.90	3.22	3.55	2.83	3.28	3.06	6.71	8.10	7.43
1973	3.89	3.22	3.53	2.79	3.24	3.03	7.06	8.37	7.75
1974	3.84	3.22	3.51	2.74	3.15	2.96	7.36	8.66	8.05
1975	3.87	3.30	3.57	2.78	3.13	2.97	7.49	8.68	8.12
1976	3.85	3.30	3.55	2.74	3.13	2.95	7.42	8.49	8.00
1977	3.82	3.27	3.52	2.66	3.08	2.89	7.35	8.33	7.88

^a1969 data were unable to be retrieved.

The general trend is an increase in the amount of credits taken in most areas over the 10 year period. The overall number of credits taken from ninth through eleventh grade in 1968 was 34.01 for all WPC Test-takers. In 1977, it was 37.26. Both sexes showed this increase.

English credits showed a slight increase from 1968 through 1977 while math credit increases were a bit larger for both sexes. Natural and social science credits from 1968 through 1977 remained fairly constant. The only area that showed an overall decrease in credits earned was foreign language.

Elective and miscellaneous courses showed the greatest increase in number of credits taken over the 10 year period. Electives are typically grouped into five course areas by the Program. These include business, home economics, industrial arts, music, and art courses. Miscellaneous courses generally include those not listed in any of the course or elective areas. These can include such things as physical education and related courses, all student-assistant activities (e.g., teacher aide, library aide, etc.), independent or directed study, work study, driver training, community service, and similar types of activities for which high schools award academic credit. Both areas showed large increases by males, females, and the total group over the 10 year period.

In examining possible interdependence between grades and credits, it appears that while females had higher grades in all five academic areas, they took roughly the same amount of credits as males in only two areas, English and social studies. They took more foreign language but less natural science and math credits. One possible implication is that males have taken more coursework in the advanced natural science and math areas where it is assumed it is more difficult to earn high grades. This hypothesis, however, does not explain why females took more foreign language credits and still earned higher grades than males in this area.

Summarizing the Findings

Test Scores

The principal question which this study has asked is whether Washington college-bound students have exhibited a decline in standardized test scores similar to the rest of the country. The answer is both yes and no.

During the early part of the study (1968-1972), students decreased on all four WPC English subtests (vocabulary, English usage, spelling, and reading comprehension). They also decreased on two of the three math areas (applied math and math achievement) and in the spatial ability area. Concurrently, both English and verbal composites decreased, at the rate of about 2% - 3% of a standard deviation per year, although the quantitative composite remained constant. These early trends, then, parallel national test score declines for college-bound students.

However, results from the second half of the study (1973-1977) do not resemble national trends. For example, only the vocabulary and English usage subtests continued to decline. The other English subtests, spelling and reading comprehension, remained constant from 1973 to 1977. In the mathematics area, students remained constant on the quantitative skills and math achievement subtests and increased on the applied math subtest. Students also remained generally constant in the spatial ability and mechanical reasoning areas of the WPC Test. Students continued to show decline on the English and verbal composites, again at an annual rate of 2% - 3% of a standard deviation, but increased on the quantitative composite (almost 1% of a standard deviation per year). The decrease on the English and verbal composites can be accounted for by the declines of both the English usage and vocabulary subtests. These declines would bring down the two composites because the remaining subtests that are included in the composites, spelling for the English and reading comprehension and spelling for the verbal composite, showed no change over the time period. This, then, did not counteract the directional influence of the English usage

and vocabulary subtests. Also, spelling is given less weight than the other subtests in the English composite.

Sex differences on the WPC subtests over the 10 year period almost totally reflect what has been traditional in terms of performance by a particular sex in specific academic areas. That is, females scored higher than males on the English areas while males scored higher than females on the mathematics, spatial ability, and mechanical reasoning areas. Higher male performance in these areas, however, may be partially explained by the fact that males took more math credits in high school than did females. De Wolf's study (1977) showed that sex differences disappeared in many of these areas when type of mathematics coursework was controlled.

Grades and Credits

The trend for college-bound students' grades over the 10 year period goes in one direction - up. This is true for all subject areas and overall GPA for both sexes. These findings are similar to those of Ferguson and Maxey (1976) who examined high school grades of entering freshman at 400 colleges and universities from 1966 to 1973. In terms of actual letter grades, for overall GPA, WPC tested-students averaged between a C+ and B in 1968 and over a B in 1977.

The amount of credits taken in most areas also rose over the 10 year period. Largest increases were in the elective and miscellaneous course areas. The traditional academic areas of English and math showed slight increases.

Final Comments

While it is true that standardized test scores, most notably for college-bound students, have dropped nationally, this trend is only partially true for Washington students taking the WPC Test between 1968 and 1977. The only area where the WPC, SAT, and ACT tests all show a decline is English. For the WPC Test, however, the decline since 1973 is only in two of the four English subtests, vocabulary and English usage. The decline in these two WPC subtests may well be partially related to some of the reasons cited elsewhere (CEEb, 1977). These

have included the dispersal of traditional learning activities in the school and a diminished attention to the mastery of skills and knowledge in the learning process.

The similarities in the score decline between national findings and those for Washington students since 1973 cease beyond the above area. The remaining WPC English subtests (i.e., spelling and reading comprehension), all three WPC math subtests, and the WPC spatial ability and mechanical reasoning subtests have shown no decline since 1973.

Why, then, has this study presented some different results than others cited earlier in this report (Munday, 1976; CEEB, 1977)?

First of all, a large percentage of the SAT score decline took place between 1963 and 1970 (CEEb, 1977). This report on WPC scores covered the late 1960's through 1977, a period that did not completely overlap with the first SAT decline. The ACT report (Munday, 1976) only went to 1975. More recent data on the ACT scores have indicated a rise in scores both during 1976-77 and 1977-78 (ACT, 1978). While these ACT data are preliminary and must be viewed over a long term, the findings are more consistent with those in this report which include WPC scores for 1978 college-bound seniors.

In addition, the WPC Test is a more comprehensive battery than either the SAT or ACT test. As indicated in Table 1, nine subtest and three composite scores are available on the WPC Test. This reflects the development of the WPC Test as a differential aptitude battery intended for use in helping students explore many career options and make better-informed career decisions and plans. Thus, while the WPC battery assesses similar skills to the SAT and ACT test, it measures additional aptitudes as well. For example, no evidence exists for college-bound students nationally on trends in their spatial perception or mechanical reasoning skills. Also, the WPC Test, in some areas, is more of an achievement than a pure aptitude test. For example, the WPC math achievement subtest was developed with the help of Washington secondary and postsecondary

math educators, based on statewide high school and college math curricula. While this accounts for the battery's considerable use as a placement tool, it also indicates that there may be a somewhat different emphasis in the type of measurement employed in some of the subtests.

Another reason for the difference in performance for Washington college-bound students and others might be the type of high school curriculum undertaken. This seems especially true in the basic academic areas. For example, some of the reasons cited for the score decline have been a dispersal of school learning activities, reflected in the adding of many elective courses and a reduction in the number of required courses, as well as evidence of diminished attention to mastery of skills and knowledge in the learning process (e.g., automatic promotions, grade inflation, reduction of homework). These reasons, however, do not totally characterize the educational experiences of Washington students. It is true that there has been an increase in grades over the study period and the students have been enrolling in more elective and miscellaneous courses. However, the overall trend has also been a constancy or an increase in the amount of credits taken in most academic areas over the 10 year period. This is true in the English, math, natural science, and social science areas. Of these, the amount of math credits taken rose the most.

The time period of this study plus the rise in academic credits taken by Washington students coupled with the fact that some of the WPC subtests are more achievement than aptitude in nature may account for the differences in score decline observed when compared to national test data. Educators and others around the state will undoubtedly have other causes or relationships to suggest.

This report has attempted to portray WPC Test score trends over a 10 year period of time, examine related academic data, and investigate possible factors relating to the trends. It is unique in that it includes actual test scores, grades, and credit data for a very large percentage of the population of one state's college-bound students, thus permitting a fairly comprehensive analysis

of statewide trends. Finally, it presents a different picture for Washington students than national trends might have implied and perhaps supports the need for other states to examine their students' test scores and other academic data in an effort to understand trends and examine potential causes.

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